Remarks

Applicants respectfully request reconsideration of the present application in view of the foregoing amendments and the following remarks. Claims 1-70 are pending in the application. Claims 1-70 are rejected. No claims have been allowed. Claims 1, 17, 23, 28, 35, 40, 49, 52, 60, and 64 are independent.

Objection to the Title

In the Action, the Examiner objects to the title. Applicants respectfully disagree but have changed the title to expedite prosecution. Applicants note that the title does not imply any limitations on the claims.

Cited Art

The Action cites U.S. Patent No. 5,699,485 to Shoham ("the Shoham patent").

Claim Rejections under 35 U.S.C. § 102

The Action rejects claims 1-70 under 35 U.S.C. 102(b) as being anticipated by the Shoham patent. Applicants respectfully submit the claims are allowable over the cited art. For a 102(b) rejection to be proper, the cited art must show each and every element as set forth in a claim. (*See* M.P.E.P. § 2131.01.) However, the cited art does not describe each and every element. Accordingly, Applicants request that all rejections be withdrawn.

Claims 1-16

Amended claim 1 recites, in part:

> the plural frames include a mix of one or more intra frames and one or more predicted frames, wherein type signaling information differentiates the one or more intra frames from the one or more predicted frames,. . . and wherein each of the one or more intra frames uses no long-term prediction from outside of the intra frame.

Applicants have amended claim 1 to include some of the language of dependent claim 14. Examples of intra frames (as compared to predicted frames) and their uses in some implementations are discussed in the Application at section IV.A:

> In some embodiments, an encoder selectively inserts intra frames among predicted frames during encoding. The intra frames act as reset (or key) frames, which allow a decoder to recover quickly and seamlessly in the event of packet loss. This improves the quality of speech communications over packet-switched networks and imperfect channels in general, even at very high loss rates, while still emphasizing compression efficiency with the predicted frames.
>
> []Intra frames allow a decoder to recover its internal state very quickly. To illustrate, if the excitation signal for a predicted frame is represented with pitches and gains for long-term prediction, and indices for amplitudes and signs of remainder samples, packet losses may prevent effective reconstruction using the pitches and gains. *An intra frame lacks the pitches and gains used for long-term prediction from another frame, but still has indices for amplitudes and signs of excitation samples.* . . .
>
> [E]fficient codecs, . . . use long-term prediction and pure predicted frames and as a result have significant memory dependence. Selective use of intra frames allows speech codecs to exploit memory dependence to achieve compression efficiency while still having resiliency to packet losses. Even at very high loss rates, the intra frames help maintain good quality.

[Application, page 21, line 16 to page 22, line 10; emphasis added.]

In its rejection of claim 1, the Action cites to section III.2.2 of the Shoham patent. This passage states:

> The signal flow at the decoder is shown in FIG. 5. First, the parameters indices are extracted from the received bitstream. These indices are decoded to obtain the coder parameters corresponding to a 10 ms speech frame. *These parameters are* the LSP coefficients, *the 2 fractional pitch delays,* the 2 fixed codebook vectors, and the 2 sets of adaptive and fixed codebook gains. The LSP coefficients are interpolated and converted to LP filter coefficients for each subframe. Then, for each 40-sample subframe the following steps are done:
>
> the excitation is constructed by adding the adaptive and fixed codebook vectors scaled by their respective gains,
>
> the speech is reconstructed by filtering the excitation through the LP synthesis filter,
>
> the reconstructed speech signal is passed through a post-processing stage, which comprises of an adaptive postfilter based on the long-term and short-term synthesis filters, followed by a high-pass filter and scaling operation.

[Shoham patent, 11:15-35, emphasis added.]

Applicants note that *every frame* decoded in the cited passage from the Shoham patent is described as containing the same set of "coder parameters." In other words, the Shoham patent does not teach or suggest "intra frames" as a type of frame different than "predicted frames," where "type signaling information differentiates the one or more intra frames from the one or more predicted frames" as recited in claim 1.

In the cited passage from the Shoham patent, Applicants further note that the "coder parameters" for every frame include "fractional pitch delays." Because every set of "coder parameters" comprises a complete set of parameters including "pitch delays," this passage is even further from teaching or suggesting "intra frames" that use "no long-term prediction from outside of the intra frame," as claim 1 recites.

Applicants further note that the Shoham patent's general description of its coder uses a linear-predictive coding model:

> The CS-ACELP coder is based on the code-excited linear-predictive (CF, LP) coding model. The coder operates on speech frames of 10 ms corresponding to 80 samples at a sampling rate of 8000 samples/sec. *For every 10 msec frame, the speech signal is analyzed to extract the parameters of the CELP model (LP filter coefficients, adaptive and fixed codebook indices and gains).* These parameters are encoded and transmitted. The bit allocation of the coder parameters is shown in Table 1. At the decoder, these parameters are used to retrieve the excitation and synthesis filter . . . parameters. The speech is reconstructed by filtering this excitation through the LP synthesis filter, as is shown in FIG. 3. The short-term synthesis filter is based on a 10th order linear prediction (LP) filter. The *long-term*, or pitch synthesis filter is implemented using the so-called adaptive codebook approach for delays less than the subframe length. After computing the reconstructed speech, it is further enhanced by a postfilter.

[Shoham patent, 9:62-10:29, emphasis added.] Again, Applicants respectfully note that the Shoham patent describes every frame has having the same parameters, which leads away from using "intra frames" and "predicted frames" where "type signaling information differentiates the one or more intra frames from the one or more predicted frames" as recited in claim 1. Applicants further note that long-term prediction using pitch delays (as in the Shoham patent) further leads away from "intra frames" that use "no long-term prediction from outside of the intra frame" as in claim 1.

For at least these reasons, the Shoham patent does not teach or suggest "intra frames" as recited in claim 1, where "type signaling information differentiates the one or more intra frames from the one or more predicted frames," and is even further from teaching or suggesting "each of the one or more intra frames uses no long-term prediction from outside of the intra frame" as recited in claim 1. Thus, the Shoham patent fails to teach or suggest each and every element of claim 1. The rejection of claim 1, as well as that of dependent claims 2-16, is improper. Applicants will not belabor the merits of the separate patentability of dependent claims 2-16.

Applicants respectfully request that the rejection of claims 1-16 be withdrawn and that the claims be allowed.

Claims 17-22

Claim 17 recites, in part:

> encoding plural *intra frames* of the plural frames, wherein the encoder sets intra frame usage and *inserts the plural intra frames among the plural predicted frames according to the intra frame usage.*

The Action rejects claims 17-22 "under similar rationale as presented against claims 1-16." [Action, page 3.] Applicants respectfully disagree with the rejection of claims 17-22.

In its rejection of claim 1, the Action cites to various sections of the Shoham patent. Applicants note that *every frame* encoded or decoded in the cited passages from the Shoham patent is described as containing the same set of "coder parameters." In other words, the Shoham patent does not teach or suggest an encoder inserting "intra frames" as a type of frame different than "predicted frames" as recited in claim 17. This passage is even further from teaching or suggesting an encoder inserting "the plural intra frames among the plural predicted frames according to the intra frame usage," as claim 17 recites.

The Shoham patent fails to teach or suggest each and every element of claim 17. The rejection of claim 17, as well as that of dependent claims 18-22, is thus improper. Applicants will not belabor the merits of the separate patentability of dependent claims 18-22. Applicants respectfully request that the rejection of claims 17-22 be withdrawn and that the claims be allowed.

Claims 23-27

Claim 23 recites, in part:

> decoding plural frames for an audio signal, wherein the plural frames include one or more *intra frames* and one or more predicted frames, and wherein *frame-level type signaling information differentiates the one or more intra frames from the one or more predicted frames* in a bitstream . . . .

The Action rejects claims 23-27 "under similar rationale as presented against claims 1-16." [Action, page 3.] Applicants respectfully disagree with the rejection of claims 23-27. In its rejection of claim 1, the Action cites to various sections of the Shoham patent. Applicants note

that *every frame* encoded or decoded in the cited passages from the Shoham patent is described as containing the same set of "coder parameters." In other words, the Shoham patent does not teach or suggest "intra frames" as a type of frame different than "predicted frames," where "frame-level type signaling information differentiates the one or more intra frames from the one or more predicted frames in a bitstream" as recited in claim 23.

The Shoham patent fails to teach or suggest each and every element of claim 23. The rejection of claim 23, as well as that of dependent claims 24-27, is thus improper. Applicants will not belabor the merits of the separate patentability of dependent claims 24-27. Applicants respectfully request that the rejection of claims 23-27 be withdrawn and that the claims be allowed.

Claim 28-34

Amended claim 28 recites, in part:

> processing primary encoded information for the frame and one or more versions of forward error correction information for the frame, wherein the primary encoded information comprises plural parameter values signaled in a bitstream, and wherein each of the one or more versions of forward error correction information comprises a subset of the plural parameter values selected based at least in part on an estimate of extra available bits and signaled in the bitstream in addition to the plural parameter values of the primary encoded information.

At section I.B the application describes examples "forward error correction" at a general level:

> Various speech codecs use forward error correction ["FEC"] to address loss of encoded information. In general, the term FEC refers to a class of techniques for controlling errors in a system. FEC involves sending extra information along with primary information. The extra information can be used by the receiver, if necessary, to correct or replace corresponding primary information if the primary information is lost.

[Application, page 6, lines 19-24.] Later, at section IV.B, the Application describes examples of "adaptive forward error correction" in some implementations:

> In some embodiments, an encoder adaptively varies forward error correction to protect the output stream against losses. This improves the actual quality of reconstructed speech when varying network conditions are taken into account, and enables intelligible reconstruction even at very high packet loss rates.

. . .

In a parameterized speech codec, some parameters are more important than other parameters, and some parameters are easier than others to estimate from surrounding information as part of error concealment. In general, the most important information to protect against loss is class information, followed by gain and pitch information. Other information (e.g., linear prediction coefficient information) may be important to reconstruction quality, but can be estimated more successfully with error concealment techniques. . . .

FIG. 9 shows a technique (900) for bandwidth adaptive FEC. The encoder assesses (910) the next frame of speech. For example, for a variable-rate codec, when the encoder classifies the frame, the encoder evaluates the complexity of the frame, determines the relative importance of the frame compared to other frames, and sets a rate allocation for the frame. . . .

The encoder estimates (930) the extra bits available. To do so, the encoder considers current rate status for the encoded frame and neighboring frames, available network bandwidth, and/or other criteria. The extra bits may be devoted to forward error correction, other error resiliency measures, and/or improved quality.

The encoder then gets (940) FEC information, using up some or all of the extra available bits. In doing so, the encoder may select between multiple subsets of previously encoded information, adjust the precision with which previous information is represented, or compute new parameters for a lower rate, lower quality, fewer sub-frames, fewer samples, etc. The encoder gets FEC information for the previous frame, multiple previous frames, or some other frame(s).

[Application, page 26, line 21 to page 27, line 30; emphasis added.]

In its rejection of claim 48, the Action states:

> [A]s per claims 28-48, Shoham (5699485) teaches frame erasure processing (col. 6 lines 14-44; col. 32 lines 30-65).

[Action, page 3.] Applicants respectfully disagree with the rejection of claims 28-34.

The Shoham patent's description of "frame erasure processing" is not sufficient to teach or suggest the above-quoted language of claim 28 because it does not teach "forward error correction information" signaled in a bitstream in addition to plural parameter values of "primary encoded information," where the "forward error correction information comprises a subset of the plural parameter values" of the primary encoded information, as recited in claim 28. Furthermore, it is even further from teaching or suggesting version(s) of forward error correction information comprising a subset of the plural parameter values "selected based at least in part on an estimate of extra available bits" as recited in claim 28.

In particular, while the first passage of the Shoham patent cited in the Action describes determination of codebook parameters when compensating for an erased frame, the

compensation is not based on any "forward error correction information" as recited in claim 28. In some cases, codebook parameters for an erased frame are randomly generated (*see* Shoham patent, 6:66-7:9). In other cases, codebook parameters for an erased frame are set to zero (*see* Shoham patent, 6:14-17, 6:51-54) or are set by repeating previously received parameters (*see* Shoham patent, 6:28-43). Using a decoder to set a codebook parameter to zero, randomly generate a codebook parameter, or repeat a previously received parameter (as in the Shoham patent) is different than, and leads away from, the above-cited "forward error correction information" language of claim 28, according to which forward error correction information is "signaled in the bitstream in addition to the plural parameter values of the primary encoded information." It is even further from teaching or suggesting, "a subset of the plural parameter values selected based at least in part on an estimate of extra available bits" as is recited in the claim.

The Action also cites to a passage of the Shoham patent from section III.4.3. Applicants note that this passage describes again error concealment based simply on "previously-received information."

> If a parity error occurs on P1, the delay value T_1 is set to the value of the delay of the previous frame. The value of T_2 is derived with the procedure outlined in Subsection III.4.1.2, using this new value of T_1. If consecutive parity errors occur, the previous value of T_1, incremented by 1, is used.
>
> *The mechanism for detecting frame erasures is not defined in the Recommendation, and will depend on the application. The concealment strategy has to reconstruct the current frame, based on previously received information.* The method used replaces the missing excitation signal with one of similar characteristics, while gradually decaying its energy. This is done by using a voicing classifier based on the long-term prediction gain, which is computed as part of the long-term postfilter analysis.

[Shoham patent, 32:39-54, emphasis added.] Again, while this passage of the Shoham patent describes error correction based on previously received data, it is clearly not "forward error correction information" as recited in the claim.

The Shoham patent fails to teach or suggest each and every element of claim 28. The rejection of claim 28, as well as that of dependent claims 29-34, is thus improper. Applicants will not belabor the merits of the separate patentability of dependent claims 29-34. Applicants respectfully request that the rejection of claims 28-34 be withdrawn and that the claims be allowed.

Claims 35-39

Amended claim 35 recites, in part:

> each of the plural versions of forward error correction information for the frame is separately signaled in a bitstream in addition to the primary encoded information for the frame, wherein the primary encoded information comprises plural parameter values, and wherein each of the plural versions of forward error correction information comprises a different subset of the plural parameter values for the frame.

The Action groups claims 35-39 with claims 28-34 in its rejections. [Action, page 3.] Applicants respectfully disagree with the rejection of claims 35-39. In its rejection of claim 28, the Action cites to various sections describing "frame erasure processing" according to the Shoham patent. The "frame erasure processing" of the Shoham patent is different than, and leads away from, "each of the plural versions of forward error correction information for the frame is separately signaled in a bitstream in addition to the primary encoded information for the frame" as recited in claim 35. In particular, using a decoder to set a codebook parameter to zero (*see* Shoham patent, 6:14-17, 6:51-54), randomly generate a codebook parameter (*see* Shoham patent, 6:66-7:9), or repeat a previously received parameter (*see* Shoham patent, 6:28-43, 32:39-54) is different than, and leads away from, the above-cited "forward error correction information" language of claim 35, according to which forward error correction information for a frame "is separately signaled in a bitstream in addition to the primary encoded information for the frame."

The Shoham patent fails to teach or suggest each and every element of claim 35. The rejection of claim 35, as well as that of dependent claims 36-39, is thus improper. Applicants will not belabor the merits of the separate patentability of dependent claims 36-39. Applicants respectfully request that the rejection of claims 35-39 be withdrawn and that the claims be allowed.

Claims 40-48

Claim 40 recites, in part:

> the forward error correction information for the first frame and the primary encoded information for the second frame are signaled in a bitstream in addition to forward error correction information for the second frame and primary encoded information for the first frame, and wherein at least some of the forward error correction information for the first frame is predictively encoded relative to the primary encoded information for the second frame.

The Action groups claims 40-48 with claims 28-34 in its rejections. [Action, page 3.] Applicants respectfully disagree with the rejection of claims 40-48. In its rejection of claim 28, the Action cites to various sections describing "frame erasure processing" according to the Shoham patent. The "frame erasure processing" of the Shoham patent is different than, and leads away from, "the forward error correction information for the first frame and the primary encoded information for the second frame are signaled in a bitstream in addition to forward error correction information for the second frame and primary encoded information for the first frame" as recited in claim 40. In particular, using a decoder to set a codebook parameter to zero (*see* Shoham patent, 6:14-17, 6:51-54), randomly generate a codebook parameter (*see* Shoham patent, 6:66-7:9), or repeat a previously received parameter (*see* Shoham patent, 6:28-43, 32:39-54) is different than, and leads away from, the above-cited "forward error correction information" language of claim 40, according to which forward error correction information for a frame is "signaled in a bitstream in addition to" the primary encoded information for frame. The Shoham patent is even further from teaching or suggesting, "at least some of the forward error correction information for the first frame is predictively encoded relative to the primary encoded information for the second frame," as recited in claim 40.

The Shoham patent fails to teach or suggest each and every element of claim 40. The rejection of claim 40, as well as that of dependent claims 41-48, is thus improper. Applicants will not belabor the merits of the separate patentability of dependent claims 41-48. Applicants respectfully request that the rejection of claims 40-48 be withdrawn and that the claims be allowed.

Claims 49-51 and 60-63

Claim 49 recites, in part:

> encoding a speech signal as plural linear prediction parameters, including *adjusting bitrate and quality for a current frame of the speech signal* based at least in part on (a) complexity of the current frame, (b) complexity and/or rate of at least some surrounding segments of the speech signal, (c) desired operating rate, (d) currently available network bandwidth, and (e) current network congestion or noise conditions or decoder feedback.

Claim 60 recites, in part:

> adjusting bitrate and quality for a current segment of the speech signal based at least in part on a quality smoothness criteria for a transition between a previous segment and the current segment.

The Action rejects claims 49-51 and 60-63 "under similar rationale to claims 1-48 as noted above." [Action, page 4.] In addition to the passages of the Shoham patent cited above, the Action bases its rejection on three passages that the Action alleges to describe "an encoder using linear prediction parameters (as noted above) based on the type of signal." [*Id.*] Applicants respectfully disagree with the rejections of claims 49-51 and 60-63.

The cited passages from the Shoham patent do not teach or suggest speech signal encoding that includes "adjusting bitrate and quality" as recited in claims 49 and 60, respectively. Much of the Shoham patent describes "frame erasure processing" performed by a decoder, which is different than encoding that includes "adjusting bitrate and quality."

At 3:29-60, the Shoham patent describes the use of a "speech coding system experiencing frame erasure." [Shoham patent, 3:29-30.] The passage does not, however describe an encoding process in any particular detail beyond citation to the G.729 proposed ITU standard. [*See* Shoham patent, 3:37-44.] In fact, the passage later notes that "[n]o modifications to the encoder are required to implement the present invention." [Shoham patent, 3:43-44.] The remainder of the passage discusses decoder-side erasure detection and concealment. Thus, the passage does not teach or suggest signal encoding that includes "adjusting bitrate and quality" as recited in claims 49 and 60, respectively.

In section III.1, the Shoham patent describes input into the encoder and output from the decoder, followed by an outline of later coder discussion. [*See* Shoham patent, 9:40-60.]

Section III.4.3.3 of the Shoham patent is focused on the actions of a Gain Predictor, which is a part of the error correction process of the decoder described above. [*See* Shoham patent 33:35-55 and 32:30-65.] As such, there is no discussion of encoder particulars in these passages either, and certainly no teaching or suggestion of the above-quoted language of claims 49 and 60, respectively.

Applicants more generally note that the Shoham patent is a directed to a system that encodes 8,000 samples/second speech using frames representing 10 milliseconds (80 samples) per frame, with 8 kilobits/second output. [*See* Shoham patent, 3:29-36, 4:36-42, 9:62-10:29.] The output bitrate of the coding system in the Shoham patent is fixed at 8 kilobits/second, which leads away from "adjusting bitrate and quality" as recited in claims 49 and 60, respectively.

For at least these reasons, the Shoham patent fails to teach or suggest each and every element of claims 49 and 60, respectively. The rejections of claims 49 and 60, as well as those of dependent claims 50, 51 and 61-63, are improper. Applicants will not belabor the merits of the separate patentability of dependent claims 50, 51 and 61-63. Applicants respectfully request that the rejection of claims 49-51 and 60-63 be withdrawn and that the claims be allowed.

Claims 52-59

Claim 52 recites, in part:

> *estimating a number of extra available bits* for a segment of the audio signal after basic encoding; and
> *using at least some of the extra available bits for adaptive forward error correction.*

The Action rejects claims 52-59 "under similar rationale to claims 1-48 as noted above." [Action, page 4.] Applicants respectfully disagree with the rejections of claims 52-59.

The cited passages from the Shoham patent do not teach or suggest encoding that includes "estimating a number of extra available bits for a segment of the audio signal after basic encoding" and "using at least some of the extra available bits for adaptive forward error correction" as is recited in claim 52. Much of the Shoham patent describes "frame erasure processing" performed by a decoder, which is different than encoding that includes "estimating a number of extra available bits" and "using at least some of the extra available bits for adaptive forward error correction."

At 3:29-60, the Shoham patent describes the use of a "speech coding system experiencing frame erasure." [Shoham patent, 3:29-30.] The passage does not, however describe an encoding process in any particular detail beyond citation to the G.729 proposed ITU standard. [*See* Shoham patent, 3:37-44.] In fact, the passage later notes that "[n]o modifications to the encoder are required to implement the present invention." [Shoham patent, 3:43-44.] The remainder of the passage discusses decoder-side erasure detection and concealment. Thus, the passage does not teach or suggest signal encoding that includes "estimating a number of extra available bits" and "using at least some of the extra available bits for adaptive forward error correction" as is recited in claim 52.

In section III.1, the Shoham patent describes input into the encoder and output from the decoder, followed by an outline of later coder discussion. [*See* Shoham patent, 9:40-60.] Section III.4.3.3 of the Shoham patent is focused on the actions of a Gain Predictor, which is a part of the error correction process of the decoder described above. [*See* Shoham patent 33:35-55 and 32:30-65.] As such, there is no discussion of encoder particulars in these passages either, and certainly no teaching or suggestion of the above-quoted language of claim 52.

Applicants more generally note that the Shoham patent is a directed to a system that encodes 8,000 samples/second speech using frames representing 10 milliseconds (80 samples) per frame, with 8 kilobits/second output. [*See* Shoham patent, 3:29-36, 4:36-42, 9:62-10:29.] The output bitrate of the coding system in the Shoham patent is fixed at 8 kilobits/second, which leads away from the "estimating a number of extra available bits" and "using at least some of the extra available bits for adaptive forward error correction" language of claim 52.

The Shoham patent fails to teach or suggest each and every element of claim 52. The rejection of claim 52, as well as that of dependent claims 53-59, is thus improper. Applicants will not belabor the merits of the separate patentability of dependent claims 53-59. Applicants respectfully request that the rejection of claims 52-59 be withdrawn and that the claims be allowed.

Claims 64-70

Claim 64 recites, in part:

> processing a frame for an audio signal, including processing first information that represents the frame as a predicted frame or intra frame, and further including processing second information that represents the frame as an intra frame, wherein the first information and the second information are signaled in a bitstream.

The Action rejects claims 64-70 "under similar rationale to claims 1-48 as noted above." [Action, page 4.] Applicants respectfully disagree with the rejections of claims 64-70.

As noted above, the Action cites to various sections describing "frame erasure processing" according to the Shoham patent. The "frame erasure processing" of the Shoham patent is different than, and leads away from, "processing first information that represents the frame as a predicted frame or intra frame, and further including processing second information that represents the frame as an intra frame, wherein the first information and the second information are signaled in a bitstream" as recited in claim 64. In particular, using a decoder to set a codebook parameter to zero (*see* Shoham patent, 6:14-17, 6:51-54), randomly generate a codebook parameter (*see* Shoham patent, 6:66-7:9), or repeat a previously received parameter (*see* Shoham patent, 6:28-43, 32:39-54) is different than, and leads away from, the above-cited language of claim 64, according to which "first information" (representing a frame as a predicted frame or intra frame) and "second information" (representing the frame as an intra frame) are both "signaled in a bitstream."

The Shoham patent fails to teach or suggest each and every element of claim 64. The rejection of claim 64, as well as that of dependent claims 65-70, is thus improper. Applicants will not belabor the merits of the separate patentability of dependent claims 65-70. Applicants respectfully request that the rejection of claims 64-70 be withdrawn and that the claims be allowed.

Interview Request

If the claims are not found by the Examiner to be allowable, the Examiner is requested to call the undersigned attorney to set up an interview to discuss this application.

Conclusion

The claims in their present form should be allowable. Such action is respectfully requested.

Respectfully submitted,

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